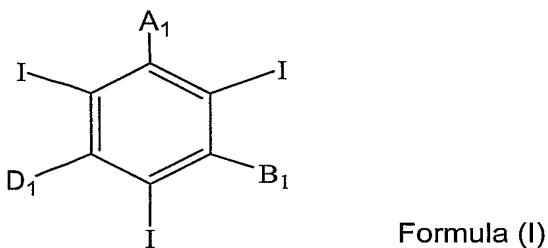


CLAIMS

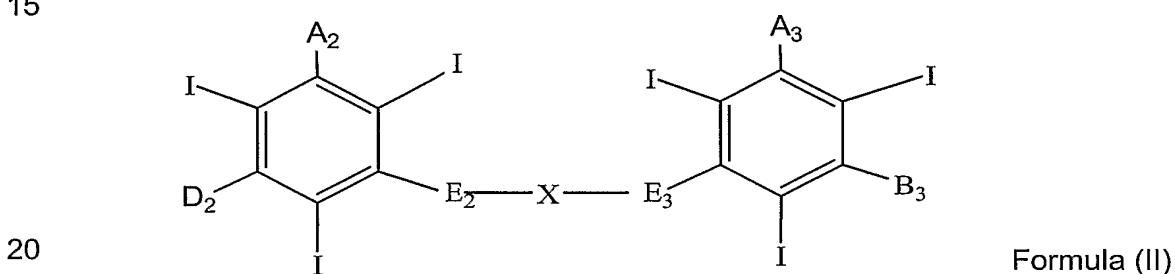
What is claimed is:

1. An injectable radiological composition for x-ray visualization during  
 5 radiological examinations, the composition comprising a pharmaceutically  
 acceptable vehicle and a mixture of at least one monomer and at least one dimer,  
 the monomer corresponding to Formula I and the dimer corresponding to Formula  
 II

10



15



wherein

A<sub>1</sub>, B<sub>1</sub>, and D<sub>1</sub> are independently -CON(R<sub>3</sub>)R<sub>1</sub> or -N(R)C(O)R<sub>2</sub>;  
 A<sub>2</sub>, A<sub>3</sub>, B<sub>3</sub>, and D<sub>2</sub> are independently -CON(R)R<sub>1</sub> or -N(R)C(O)R<sub>2</sub> provided,  
 25 however, at least one of A<sub>2</sub> and A<sub>3</sub> is -CONH<sub>2</sub>;  
 E<sub>2</sub> and E<sub>3</sub> are independently selected from the group consisting of  
 -CON(R)-, -N(R)C(O)- and -N(COR<sub>2</sub>)-;  
 each R is independently H, a linear or branched (C<sub>1</sub> - C<sub>8</sub>) alkyl residue,  
 optionally substituted by one or more hydroxy, alkoxy or hydroxyalkoxy groups or  
 30 combinations thereof, or a member of a (C<sub>3</sub> - C<sub>7</sub>) cyclic residue, said cyclic  
 residue being optionally interrupted by -O-, -S- or -NR<sub>4</sub>-, and/or optionally  
 substituted with one or more hydroxy, alkoxy or hydroxyalkoxy groups or  
 combinations thereof, the cyclic residue comprising R, the nitrogen atom to which

it is bonded and another moiety, that moiety being (i)  $-C(O)R_2$  when  $A_1, A_2, A_3, B_1, B_3, D_1$  or  $D_2$  is  $-N(R)C(O)R_2$  or (ii)  $R_1$  when  $A_2, A_3, B_3$ , or  $D_2$  is  $-CON(R)R_1$ ;

each  $R_1$  is independently (i) hydrogen, (ii) a linear or branched ( $C_1 - C_8$ ) alkyl residue, optionally substituted with one or more hydroxy, alkoxy,

5 hydroxyalkoxy groups or combinations thereof or by  $-NRC(O)R_1$  or  $-C(O)N(R)R_1$ , (iii) the residue of a carbohydrate, or (iv) a member of a ( $C_3 - C_7$ ) cyclic residue, said cyclic residue being optionally interrupted by  $-O-$ ,  $-S-$  or  $-NR_4-$ , and/or optionally substituted by one or more hydroxy, alkoxy or hydroxyalkoxy groups or combinations thereof, the cyclic residue comprising  $R_1$ , the nitrogen atom to which

10 it is bonded and another moiety, that moiety being (a)  $R$  when  $A_2, A_3, B_3$ , or  $D_2$  is  $-CON(R)R_1$  or (ii)  $R_3$  when  $A_1, B_1$ , and  $D_1$  is  $-CON(R_3)R_1$ ;

each  $R_2$  is independently (i) a linear or branched ( $C_1 - C_8$ ) alkyl residue, optionally substituted with one or more hydroxy, alkoxy or hydroxyalkoxy groups, or combinations thereof or (ii) a member of a ( $C_3 - C_7$ ) cyclic residue, said cyclic

15 residue being optionally interrupted by  $-O-$ ,  $-S-$  or  $-NR_4-$  and/or optionally substituted with one or more hydroxy, alkoxy or hydroxyalkoxy groups or combinations thereof, the cyclic residue comprising  $R_2$ ,  $R$ , the nitrogen atom to which  $R$  is bonded and the carbonyl moiety to which  $R_2$  is bonded;

each  $R_3$  is independently linear or branched ( $C_1 - C_8$ ) alkyl residue,

20 optionally substituted with one or more hydroxy, alkoxy or hydroxyalkoxy groups or combinations thereof, or taken together with  $R_1$  and the nitrogen atom to which  $R_3$  and  $R_1$  are bonded, form a ( $C_3 - C_7$ ) cyclic residue, said cyclic residue being optionally interrupted by  $-O-$ ,  $-S-$  or  $-NR_4-$ , and/or optionally substituted by one or more hydroxy, alkoxy or hydroxyalkoxy groups or combinations thereof;

25 each  $R_4$  is independently hydrogen or a linear or branched ( $C_1 - C_8$ ) alkyl residue, optionally substituted with one or more hydroxy, alkoxy, hydroxyalkoxy groups or combinations thereof; and

X is a bond or a linear or branched ( $C_1 - C_8$ ) alkylene chain which is optionally substituted by up to six hydroxy groups, said alkylene chain being

30 optionally interrupted by  $-O-$ ,  $-S-$ ,  $-NR_4-$  or  $-N(R)C(O)-$  groups.

2. The composition of claim 1 wherein  $A_2$  and  $A_3$  are independently  $-C(O)NH_2$ .

3. The composition of claim 1 wherein X is methylene.
4. The composition of claim 1 wherein A<sub>1</sub> and B<sub>1</sub> are -C(O)N(R<sub>3</sub>)R<sub>1</sub>, and each R<sub>3</sub> and R<sub>1</sub> of A<sub>1</sub> and B<sub>1</sub> are as defined in claim 1.  
5
5. The composition of claim 4 wherein D<sub>1</sub> is -N(R)C(O)R<sub>2</sub>, and R and R<sub>2</sub> are as defined in claim 1.
6. The composition of claim 1 wherein A<sub>1</sub> and B<sub>1</sub> are -CONHR<sub>3</sub> wherein each R<sub>3</sub> of A<sub>1</sub> and B<sub>1</sub> is independently methyl, hydroxymethyl, ethyl, hydroxyethyl, propyl, hydroxypropyl, or dihydroxypropyl.  
10
7. The composition of claim 6 wherein D<sub>1</sub> is -N(R)C(O)R<sub>2</sub>, and R and R<sub>2</sub> are as defined in claim 1.  
15
8. The composition of claim 1 wherein A<sub>1</sub> and B<sub>1</sub> are -CONR<sub>1</sub>R<sub>3</sub> wherein each R<sub>1</sub> and R<sub>3</sub> of A<sub>1</sub> and B<sub>1</sub> is independently methyl, hydroxymethyl, ethyl, hydroxyethyl, propyl, hydroxypropyl, or dihydroxypropyl.
9. The composition of claim 8 wherein D<sub>1</sub> is -N(R)C(O)R<sub>2</sub>, and R and R<sub>2</sub> are as defined in claim 1.  
20
10. The composition of claim 1 wherein D<sub>1</sub> is -N(R)C(O)R<sub>2</sub>, and the R and R<sub>2</sub> substituents of D<sub>1</sub> are independently methyl, hydroxymethyl, ethyl, hydroxyethyl, propyl, hydroxypropyl, 1-methoxy-2-hydroxypropyl, or dihydroxypropyl.  
25
11. The composition of claim 10 wherein A<sub>1</sub> and B<sub>1</sub> are -CONHR<sub>3</sub> wherein each R<sub>3</sub> of A<sub>1</sub> and B<sub>1</sub> is independently methyl, hydroxymethyl, ethyl, hydroxyethyl, propyl, hydroxypropyl, or dihydroxypropyl.  
30
12. The composition of claim 10 wherein A<sub>1</sub> and B<sub>1</sub> are -CONR<sub>1</sub>R<sub>3</sub> wherein each R<sub>1</sub> and R<sub>3</sub> of A<sub>1</sub> and B<sub>1</sub> is independently methyl, hydroxymethyl, ethyl, hydroxyethyl, propyl, hydroxypropyl, or dihydroxypropyl.

13. The composition of claim 2 wherein at least one of A<sub>1</sub>, B<sub>1</sub> and D<sub>1</sub> is -CONR<sub>1</sub>R<sub>3</sub> wherein R<sub>1</sub> is hydrogen.

5 14. The composition of claim 2 wherein one of A<sub>1</sub>, B<sub>1</sub> and D<sub>1</sub> is -N(R)C(O)R<sub>2</sub> and R and R<sub>2</sub> are as defined in claim 1.

10 15. The composition of claim 1 wherein the monomer is selected from the group consisting of iomeprol, iopromide, ioversol, iohexol, iopentol, iopamidol and iobitridol.

16. The composition of claim 1 wherein the dimer is iosmin.

15 17. The composition of claim 1 wherein the monomer is selected from the group consisting of ioversol, iohexol, and iopamidol, and the dimer is iosmin.

18. The composition of claim 1 wherein the monomer is ioversol and the dimer is iosmin.

20 19. The composition of claim 1 wherein the composition further comprises pharmaceutically acceptable radiological vehicles selected from the group consisting of aqueous buffer solutions, sterile water for injection, physiologic saline, balanced ionic solutions, chelating agents, and other non-radioactive additives comprising excipients and anticoagulants.

25 20. The composition of claim 19 wherein said aqueous buffer solutions comprise tris(hydroxyethyl)amino methane and salts thereof, phosphate, citrate and bicarbonates; wherein said balanced ionic solutions comprise chlorides and bicarbonates of cations selected from the group consisting of Ca, Na, K, and Mg, and other halides, carbonates, sulphates, phosphates of Na, K, Mg and Ca; wherein said chelating agents consist of H<sub>4</sub>EDTA, EDTACaNa<sub>2</sub> and calcium monosodium DTPA-BMEA; wherein said excipient is glycerol, polyethylene glycol or dextran; and wherein said anticoagulant is heparin or hirudin.

21. The composition of claim 1 wherein the composition further comprises a contrast agent other than the monomer and the dimer.

22. The composition of claim 21 wherein said other contrast agent is 5 selected from the group consisting of other X-ray contrast agents, magnetic resonance imaging agents, radionuclide imaging agents, ultrasound imaging agents and optical imaging agents.

23. A method of diagnostic imaging, the method comprising administering 10 to an individual a composition of claim 1, and carrying out an imaging procedure on such individual.

24. The method of claim 23 wherein said composition comprises a monomer selected from the group consisting of ioversol, iohexol and iopamidol, 15 and the dimer is iosimanol.

25. The method of claim 23 wherein said composition comprises a mixture of ioversol and iosimanol.

26. A method of diagnostic imaging, the method comprising administering 20 to an individual a composition of claim 22, and carrying out an imaging procedure on such individual.